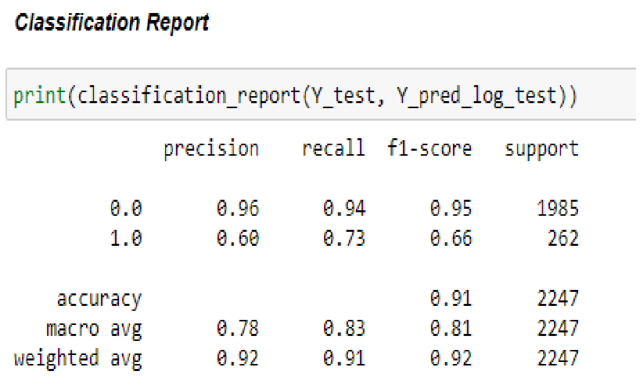
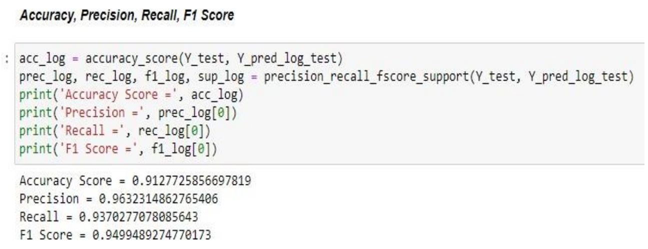
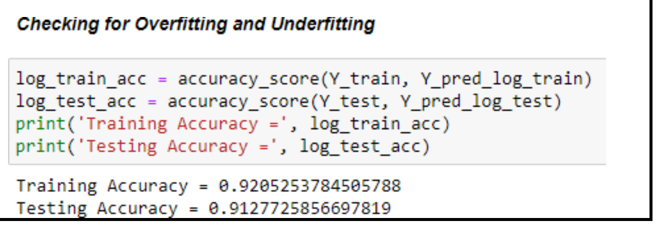
Performance Test

Date	18 November 2022
Team ID	PNT2022TMID36549
Project Name	Project - Developing a Flight Delay Prediction Model using Machine Learning
Maximum Marks	10 Marks

Model Performance Testing:

S.No.	Parameter	Values	Screenshot
1.	Metrics	**Classification Model:** Confusion Matrix - , Accuray Score- & Classification Report -	

Classification Report

```
print(classification_report(Y_test, Y_pred_log_test))
```

```
              precision    recall  f1-score   support

         0.0       0.96      0.94      0.95      1985
         1.0       0.60      0.73      0.66       262

    accuracy                           0.91      2247
   macro avg       0.78      0.83      0.81      2247
weighted avg       0.92      0.91      0.92      2247
```

Accuracy, Precision, Recall, F1 Score

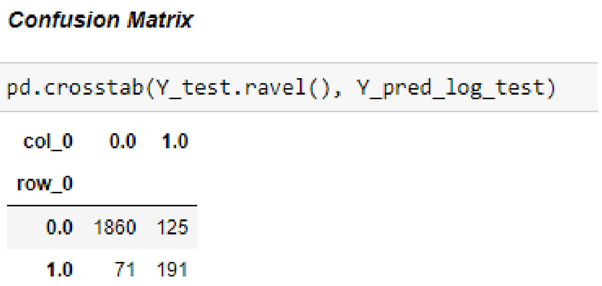
```
acc_log = accuracy_score(Y_test, Y_pred_log_test)
prec_log, rec_log, f1_log, sup_log = precision_recall_fscore_support(Y_test, Y_pred_log_test)
print('Accuracy Score =', acc_log)
print('Precision =', prec_log[0])
print('Recall =', rec_log[0])
print('F1 Score =', f1_log[0])
```

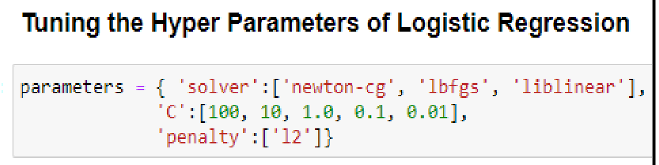
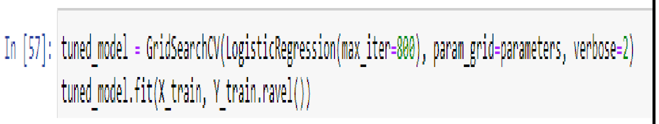
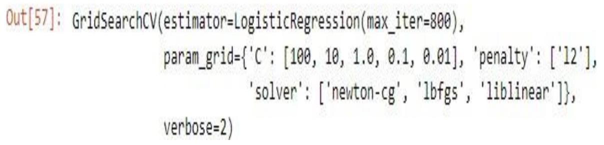
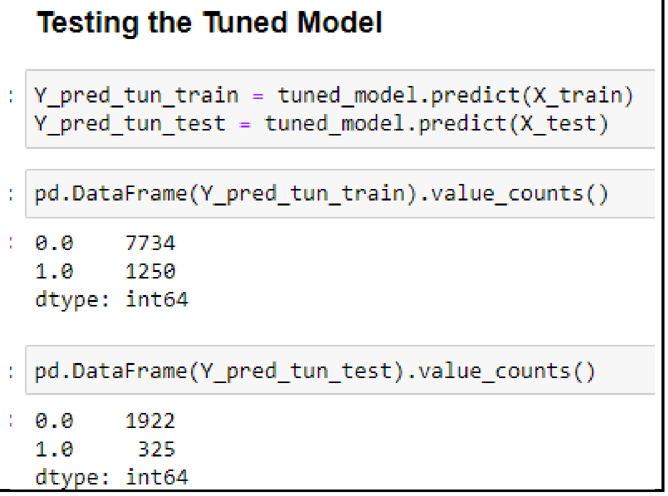
```
Accuracy Score = 0.9127725856697819
Precision = 0.9632314862765406
Recall = 0.9370277078085643
F1 Score = 0.9499489274770173
```

Checking for Overfitting and Underfitting

```
log_train_acc = accuracy_score(Y_train, Y_pred_log_train)
log_test_acc = accuracy_score(Y_test, Y_pred_log_test)
print('Training Accuracy =', log_train_acc)
print('Testing Accuracy =', log_test_acc)
```

```
Training Accuracy = 0.9205253784505788
Testing Accuracy = 0.9127725856697819
```

			 ***Confusion Matrix*** `pd.crosstab(Y_test.ravel(), Y_pred_log_test)` col_0 0.0 1.0 row_0 0.0 1860 125 1.0 71 191

2.	Tune the Model	Hyperparameter Tuning - Validation Method -	
			Tuning the Hyper Parameters of Logistic Regression
			`parameters = { 'solver':['newton-cg', 'lbfgs', 'liblinear'],`
			`'C':[100, 10, 1.0, 0.1, 0.01],`
			`'penalty':['l2']}`
			
			`In [57]: tuned_model = GridSearchCV(LogisticRegression(max_iter=800), param_grid=parameters, verbose=2)`
			`tuned_model.fit(X_train, Y_train.ravel())`
			
			`Out[57]: GridSearchCV(estimator=LogisticRegression(max_iter=800),`
			`param_grid={'C': [100, 10, 1.0, 0.1, 0.01], 'penalty': ['l2'],`
			`'solver': ['newton-cg', 'lbfgs', 'liblinear']},`
			`verbose=2)`
			
			Testing the Tuned Model
			`Y_pred_tun_train = tuned_model.predict(X_train)`
			`Y_pred_tun_test = tuned_model.predict(X_test)`
			`pd.DataFrame(Y_pred_tun_train).value_counts()`
			`0.0    7734`
			`1.0    1250`
			`dtype: int64`
			`pd.DataFrame(Y_pred_tun_test).value_counts()`
			`0.0    1922`
			`1.0     325`
			`dtype: int64`

Evaluating the Timed Model using I¥letrics

Classification Report

```
pnint(classification_report(Y_test, Y_pred_tun_test))

              precision    recall  f1-score   support

         B.B       6. 97      B.94      6. 9S      1985
         1.0       0.61       B.7d      0. 6B       262

    accuracy                            0.92       2247
   macro avg       0. 79      B.BS      0. 81      2247
weighted avg       6. 93      B.92      8.92       2247
```

Accuracy Pzecis•n, recall, ri scoe

```
plec ten, rec tun, f't ten, sup tun precision recall fscore support(Y test, 'Y peed tun test)

print('Recall =', rec ten[8])
print( £1 Score =', of tun[e])
```

```
Accuracy Score - 0.9158878504672897
Frecislon = 8.96722164412870 75
Recall - 6.9J65239294710J28
FI Score = 0.95J6252879447147
```

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```
tun_train_acc = accuracy_score(Y_train, Y_pred_tun_train)
tun test acc = accuracy score(Y test, Y pred tun test)
print('Training Accuracy =', tun_train_acc}
pnint(’Testing Accuracy =’, tun test acc)

Tra1 ning Accuracy = 0 . 9213B45414B694S 7
Testing Ac cur•acy = B . 9158878504672897
```

Confusion Matrix

```
pd.crosstab(Y_test.ravel(), Y_pred_tun_test)

col_0   0.0   1.0

  0.0  1859   126
  1.0    63   199
```